

CLAIMS

1. In a safe control system comprising a field bus, an administration unit and a plurality of safe bus users, all of which being connected to said field bus, a method of allocating a defined user address to a selected bus user when connecting the same to said field bus, said method comprising the steps of:
  - activating a special maintenance mode in said administration unit,
  - repeatedly sending out a defined maintenance message from said administration unit to said plurality of bus users,
  - connecting said selected bus user to said field bus,
  - receiving said defined maintenance message by said selected bus user,
  - sending out a first registration message from said selected bus user to said administration unit, said first registration message containing a predetermined universal address,
  - sending out an address allocation message from said administration unit to said selected bus user, said address allocation message containing said defined user address to be allocated,

- receiving said address allocation message by said selected bus user, and
  - storing said defined user address in a memory of said selected bus user.
2. The method of Claim 1, wherein said selected bus user, after receiving said address allocation message, sends out a second registration message to said administration unit, said second registration message containing said defined user address.
  3. The method of Claim 2, wherein said administration unit automatically terminates said special maintenance mode after reception of said second registration message from said selected bus user.
  4. The method of Claim 2, wherein said selected bus user sends out said first registration message to said administration unit only after the first reception of said defined maintenance message, whereas it sends out said second registration message to said administration unit on each following reception of said defined maintenance message.
  5. The method of Claim 1, wherein said defined user address is transmitted to said administration unit from an external input device at the beginning of said special maintenance mode.

6. The method of Claim 1, wherein said administration unit generates a fault signal if it receives more than one first registration messages.
7. The method of Claim 1, wherein said first registration message and said address allocation message are each answered with an acknowledgment message.
8. In a safe control system comprising a field bus, an administration unit and a plurality of safe bus users, all of which being connected to said field bus, a method of allocating a defined user address to an exchange bus user which is intended to replace an old bus user, wherein said old bus user comprises an old user address, said method comprising the steps of:
  - providing a nominal configuration of said control system in said administration unit, said nominal configuration representing the number and user addresses of all bus users connected to said field bus,
  - disconnecting said old bus user from said field bus,
  - activating a special maintenance mode in said administration unit,
  - repeatedly sending out a defined maintenance message from said administration unit to the remaining ones of said plurality of bus users connected,

- sending out response messages from the remaining ones of said plurality of bus users to said administration unit,
- identifying said old bus user by means of said nominal configuration and said response messages,
- selecting said old user address as defined user address to be allocated to said exchange bus user,
- connecting said exchange bus user to said field bus,
- receiving said defined maintenance message by said exchange bus user,
- sending out a first registration message from said exchange bus user to said administration unit, said first registration message containing a predetermined universal address,
- sending out an address allocation message from said administration unit to said exchange bus user, said address allocation message containing said defined user address to be allocated,
- receiving said address allocation message in said exchange bus user, and
- storing said defined user address in a memory of said exchange bus user.

9. A method of configuring a safe bus user when connecting it to a field bus of a safe control system, wherein a defined user address is allocated to said safe bus user, said method comprising the steps of:
- sending out a first registration message from said safe bus user to an administration unit connected to said field bus, said first registration message containing a predetermined universal address,
  - sending out an address allocation message from said administration unit to said safe bus user, said address allocation message containing said defined user address to be allocated, and
  - storing said defined user address in a memory of said safe bus user.
10. The method of Claim 9, wherein said safe bus user sends out said first registration message to said administration unit after receiving a defined maintenance message.
11. The method of Claim 9, wherein said safe bus user, after receiving said address allocation message, sends out a second registration message to said administration unit, said second registration message containing said defined user address.
12. The method of Claim 11, wherein said safe bus user sends out said first registration message to said administration unit only after the first reception of said defined main-

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tenance message, whereas it sends out said second registration message to said administration unit on repeated reception of said defined maintenance message.

13. The method of Claim 10, wherein said defined maintenance message is sent out only after activation of a special maintenance mode of said administration unit.
14. The method of Claim 13, wherein said administration unit automatically terminates said special maintenance mode after reception of said second registration message.
15. The method of Claim 13, wherein said defined user address is transmitted to said administration unit at the beginning of said special maintenance mode.
16. The method of Claim 15, wherein said administration unit generates a fault signal if it is determined that said user address transmitted has already been allocated to a bus user connected to said field bus.
17. The method of Claim 10, wherein said administration unit sends out maintenance messages to all bus users connected to said field bus at predefined time intervals.
18. The method of Claim 9, further comprising the steps of:
  - checking if all said bus users connected to said field bus are actively present by means of a nominal configuration of bus users and by means of response messages of said bus users, and

- sending out the user address of a bus user which is recognized as no longer active as said defined user address.
19. The method of Claim 9, wherein said administration unit generates a fault signal if more than one bus user sends out said first registration message.
  20. The method of Claim 9, wherein said first registration message and said address allocation message are each answered with an acknowledgment message.
  21. Control system for safely controlling safety-critical processes, comprising a field bus, an administration unit, and at least one safe bus user all of which being connected to said field bus, said safe bus user comprising a registering unit for registering with said administration unit under a predetermined universal address, a memory for storing a user address allocated to said bus user, and a receiver for receiving and evaluating an address allocation message from said administration unit, said address allocation message containing said user address to be allocated.